ASTUN Atari ST User's News

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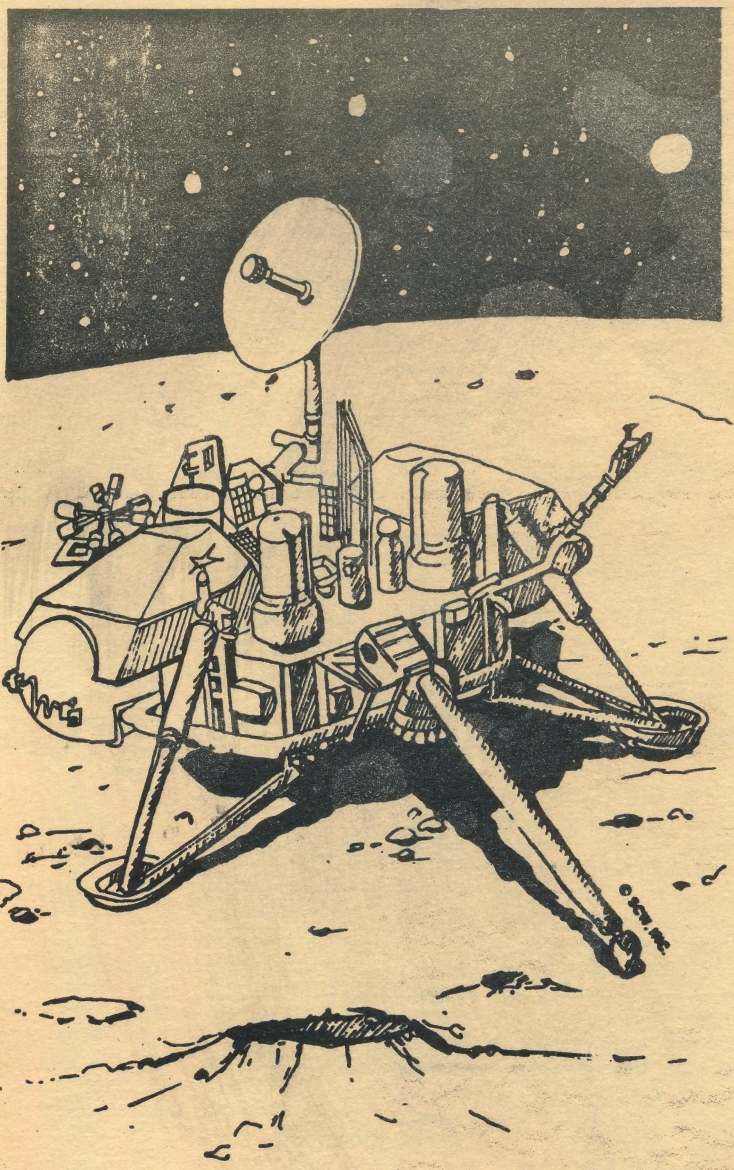

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TABLE OF CONTENTS

Atari Declares War On U.S. Computer Industry . . . . . Page 3
by Randy Larsen

Backup Review . . . . . Page 6
by Jeffrey McArthur

Editors Notes . . . . . Page 13
by Ralph Porter

GEnie Information Service . . . . . Page 22
Authur Unknown

How to Get The Most Out of Compuserve . A Book Review. . . . . Page 19
by Eric Plent

Omnitrends Universe II Review . . . . . Page 10
by Mark Cramer

PC Pursuit Information . . . . . Page 20
downloaded from a PC Pursuit BBS

Program Documentation . . . . . Page 5
by Steve Nyce

Softworks Basic Review . . . . . Page 9
by Larry Fishel

ST BBS LIST . . . . . Page 15
Compiled by Tom Zelinski

STUN Letter . . . . . Page 4
by Randy Larsen

Textpro Review . . . . . Page 8
by Rod Swanson

Two Popular BBS Programs Reviewed . . . . . Page 12
Author Unknown

Winter Games Review . . . . . Page 9
by Steve Tearle

Winter Games Review . . . . . Page 19
by Eli Tomlinson

XMODEM/YMODEM Protocol Reference . . . . . Page 23
by Chuck Forsberg

ATARI CORP. DECLARES WAR ON U.S. COMPUTER INDUSTRY

Several new "weapons" in the competitive U.S. computer market were announced by Atari at a private news conference. Products that have been previously promised were announced for release by Atari but the real surprises were a complete reworking of the ST workstation for the professional/power user and a new line of IBM compatible computers called the "Atari PC". With these entries directed at the business computer user Atari intends to make gains on the industry leaders.

The new ST is called the "Mega ST" and comes with either 1 meg.,2 meg, or 4 megabytes of RAM memory. Graphics speed on the machine will be enhanced by the awaited "Blitter" chip now being manufactured for inclusion in the new ST models and the operating system has been upgraded to make use of the "Blitter". A big advantage to the "Mega" over Atari's 520ST is the size of the machine's footprint. The motherboard has been separated from the keyboard and resides in a low profile 22" X 22" case built strong for use as a stackable monitor stand. Also in this unit is the 3 1/2" double sided disk drive (now facing toward the user not the side of the computer). A realtime clock/calendar chip with battery backup will be standard equipment. The "Mega" has the regular ST computer ports and additional ones for plugging in the keyboard and a new DMA port. The Hard Disk port still remains but this new DMA port will allow direct connect of other DMA devices such as Atari's Laser Printer (still under development). The Atari SH204 Hard Disk Drive will come in a redesigned case with the same dimensions as the "Mega" and will be stackable under the monitor. All power supplies will be internal leaving a very compact and flexible desktop unit. The detatched keyboard has an improved feel and the coiled connector cable allows the unit to be placed in the lap or adjusted to your favorite typing angle when placed on the desktop. These features of the new "Mega ST" are a direct result of communication with ST users. Atari spokesman Neil Harris says, "Most of the improvements we've made in the basic ST design have been taken from 'wish lists' that have come out of our dialogue with users over the past year."

The "Atari PC" is Atari's first serious threat to the supremacy of IBM PC's in the office. The new computer offers the features of a beefed up PC/XT-compatible at the price of a stripped down model (Power Without the Price). Computer with 512K of system RAM, 256K of dedicated display RAM, XT-style keyboard, and internal 5 1/4" disk drive are priced at $499.00. Together with the new intelligent monochrome monitor Atari prices its PC/XT clone at $699.00. This will be the first IBM PC-compatible product that includes support for the EGA graphics mode as a standard feature. Usually the upgrade to EGA graphics costs several hundred dollars. Software written for use with EGA, CGA, Hercules graphics, or IBM Monochrome modes will all work properly on this system asuring virtually 100% compatibility with IBM PC or XT. Output from the color circuitry is interpreted in 16 "gray scales" by Atari's monochrome monitor. EGA resolution is 640 x 350 with 16 colors. Included with the "Atari PC" will be GEM (the now familiar graphics user interface from DRI) and a mouse and mouse port which are available only at extra cost on competitors' computers.

These two elegantly designed computers, the "Mega ST" and the "Atari PC" will surely bring Atari into the workplace as a professional workstation.

Soon to be included in Atari's printer line-up will be the somewhat

unconventional Atari Laser Printer. The power of the ST itself is the reason for the predicted "under $1500" price. The Laser Printer will be designed without its own processor and data will be fed to it at 10 megabits/sec. through the ST's DMA port under software control. This means that an ST, equipped with sufficient memory, will be able to use any type font and any page description language to process and print ultra-fine resolution graphics and text output faster than other more conventional desktop publishing systems. The "Mega ST" and Atari's new Laser Printer make up a high-performance system that will be available for less than half the price of other comparable hardware. That certainly is "Technology so advanced, it's affordable".

Dear STUN Members,

What a whirlwind trip! I was able to attend the Winter CES in Las Vegas with Ralph and Brad. We didn't get away from Salt Lake until 11:00 pm Wednesday because of work schedules. That put us arriving there in the early morning hours after an all night drive through bad weather. We had time for a buffet breakfast and a little men's room cleanup before attending Atari's press conference. We heard Sam and Jack Tramiel declare war on the computer industry in the United States. Jack fielded a question about Atari's "game machine" image entering into the office with the "Atari PC" clone. He said that he knew that a little computer game playing went on in every office. Sam seemed more content to assume that the new computer would be all work and no play. We heard new product announcements of the PC/XT clone with all the features and little of the price. We heard of an "under $100" 1200 bps modem for the XE and ST. We heard of a new ST called the "Mega ST" which I thought would just be a simple memory upgraded 1040ST. Later, at Booth 6500 in the L.V. Convention Center's West Hall, I found out how wrong I was. There, with the power still turned off was a completely redesigned computer with detached keyboard labeled "MEGA ST4". I picked the system unit up off the table an inch to see how much it weighed and tipped it forward to see the I/O ports available on the back. As I was discovering the one extra port the "Mega" has I was accosted by an Atari employee who advised me that they couldn't have me handling the new computer and that the computers designer, John Feagans would be in soon to answer any questions I had about the machine. John did come within minutes carrying internal parts to a Laser Printer. When he installed the cartridge into the printer he began to hook up the "Mega". It wouldn't boot up! Boy was I worried! I haul my 520ST back and forth to meetings each month and it takes it like a champ. John began to open the case on the CPU of the new computer and I called to Ralph, "He's going to show us the inside of the 4 meg." John corrected me that he "was not going to show us". I corrected my statement to: "He's going to open the case and we're going to watch. What a sight. For some reason I expected a single plane motherboard with miniature parts. Instead, I saw a combination of right-side-up and up-side-down and edge mounted cable connected boards with resistors and capacitors and transistors and other components wire-wrapped into the system. Brad told me it's called a "kludge". John wiggled a couple of connectors and fired up the "prototype" and it came to life. Later I found out that the 2 megabyte version of the new computer that was on display was also a prototype built by a different design team. We made it crash several times - even once while we were only trying to format a disk from the desktop. None the less I am confident that Atari's new "Flagship", the "Mega ST" will be a fabulously beautiful and functional design for us all to be proud of. I think I am even going to be proud of the "Atari PC".

Happy hacking,
Randy Larsen

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REM* * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
REM*                                                                     *
REM*                    PROGRAM DOCUMENTATION                            *
REM*                          by Steve Nyce                              *
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Doing a good job of documenting your programs can pay huge dividends in two main areas: helping you to write better programs, and helping others and yourself comprehend the programs after they are written.

Since explaining spagetti code in English is much harder than coding spagetti code, documenting as you code will tend to make you write more straight forward, structured programs. Documenting also tends to make well hidden bugs more visible so that they can be eliminated.

Programs often require maintenance long after they are written, either to fix bugs, make changes, or for enhancements. Program documentation can make it easier for a programmer doing maintenance to understand a program, even if he is working with it for the first time. And if he is the original author, the documentation can help him to re-familiarize himself with the code.

Creating good program documentation is a real art that takes a good deal of practice to perfect. Under-documenting is the most common mistake made, but over-documenting can also hurt a program's readability. When adding documentation to a program the goal should be to enhance the readability of the code to the point where a programmer who has never seen the program before can understand and follow the code with ease. This should be done using as few words as possible.

In most programming languages documentation comes in the form of "comment" or "remark" statements which are coded on their own separate lines, strategically placed among the other lines of code. The comments either clarify code that is not readily understandable on its own, or summarize lines of code which are related. If you can tell what a line of code is doing just by reading it, there is no need for a comment explaining that line. This type of "self-documenting" code is highly recommended, but is not always easy to do. Any line of code that is not self-documenting should be accompanied by a comment.

Comments that summarize related lines of code can be real time savers. A typical summarizing comment might give a brief (one or two sentence) summary of 20 lines of code that follow it. Then, rather than having to read 10 or 20 lines of code to see if this was the section of code you were looking for, you only have to read the one or two summary sentences. This type of comment should appear at the start of every module or related section of code (depending on the language, a module may be referred to as a function, procedure, subroutine, paragraph, etc.)

There are also times when you may not want to document. A program that is only 10 lines long and is self-documenting probably wouldn't need any comments. But for the most part, documenting your programs is a good habit to get into. And who knows, you may learn to enjoy the challenge of documenting as much as the challenge of programming.

BACKUP!

A Review by Jeffrey McArthur

There has been a real problem for people who own an Atari ST and a hard disk. How do I back up all the data on my hard disk. With 10, 20, and 60 Meg hard drives available there can be a lot of valuable information that you don't want to be lost if something happened to the hard disk.

Although, it is possible to copy files from the the hard disk over to a floppy by hand, it is slow, prone to error, and very inconvenient. Also, you have to choose which files to copy. There was no way to do an incremental backup. An incremental backup is copying only those files which have been added or changed since the last backup. Incremental backups are generally quite fast because, only the information that has changed needs to be backed up. Many computer mainframes do an incremental backup daily; and only a full backup once a week or month.

On the Atari ST there is one thing that causes problems with copying files by hand. The problem is a "bug" in TOS. When you have a hard disk, it is not unusual to have several hundred files. But every file you add, causes TOS to slow down when it tries to open another one. This is because TOS searches through every file name until it finds one that matches. This can take quite a while. When you have over 300 files in a folder, it can take several minutes to copy a file to or from that folder.

With those problems in mind, Michtron created a utility called BACKUP!. Note that the exclamation point is part of their name. It allows the user to "backup" and "restore" data off of the hard disk in an orderly and easy fastion. Backup! is not very expensive (around $30) and is not copy protected. The disk comes with four files on it: backup.prg, backup.rsc, sbackup.ttp and srestore.ttp. Backup.prg and backup.rsc are a GEM based backup and restore utility. Sbackup.ttp and srestore.ttp are the command based versions of the same utility. Both are capable of the same features, but Michton has wisely determined that some people like to click icons and others have not. They give you both options.

A good program to compare Michton's Backup! to is the IBM utility program Backup.com and Restore.com for the IBM pc. They are very similar. Both allow you to back up a hard disk. Michton's program has some very nice features. It allows you to format the floppies as you need them. So there is no need to format a bunch of floppies beforehand and hope that you do not run out. The program also knows about several different formats: Single sided, 40 track, 9 sector through double sided, 80 track, 10 sector. Unfortunately it does not know how to format using 82 tracks. However, if you format the disks yourself with 82 tracks, the program does use them.

The GEM based version is very easy to use. You just click the option you want. On a color screen, the options appear to be a little crowded but they are very readable (at least in medium res). The command version (.ttp) is also easy to use if you understand the documentation and know what parameters to give it.

The documentation is very good. Every option is well documented. In all there are 14 pages of documentation. But the user can start immediately if they use the GEM based version without even looking at the documentation. To use the command version is almost impossible without looking at the documentation; since it wants all the parameters given to it immediately. If you are using something the Micro C Shell then it would be very easy to write a batch file to call sbackup.ttp with all the apropriate parametes.

Backup! gives you several different types of backup. There is the capability of doing an image backup. This allows the program to backup much quicker by producing floppies that are their own format. The floppies produced by an image backup do contain an exact image of the hard disk. Therefore, you cannot just restore one file from an image backup. you have to restore the entire hard disk partition. Some of the other forms are a full file backup, an incremental file backup, and two different incremental by date backup.

The full file backup is simply an automated way of copying every file on the hard disk over to the floppies. The floppies will have every file and the files will be in the standard TOS format. So you could actually execute programs from the floppies.

The incremental backups only backup files that have changed. There are three different ways to specify which files have changed. TOS keeps a bit in the directory of each file saying if it has changed since the last backup. This bit is used for the normal incremental backup. You can also backup files by date and time. You can say, backup any file after a certain date or time. Or you can say, that the date and time is to come from the backup history file which backup maintains on every hard disk.

One very nice feature is that BACKUP! knows how to save the date of the file. So if you backup a file and then restore it, the date will not have changed. This is not true if you just copy the file to a floppy and then back. This allow people who use utilities like Make the ability to use Backup! without worry about the date and time of the files changing.

Despite all its nice features, Backup has some problems and a couple of bugs. First, doing a full file backup of 7 meg of data off of a 10 meg partition takes over 4 hours. It is very slow doing file backups. Backup also claims to be able to split files across floppies. But sometimes it is not able to restore them. This means that you have lost a file. There is an option to prevent backup from splitting files and I highly recommend its use. Backup! in general is not very graceful in handling errors. If you put the wrong disk in when it is trying to restore a split file, it says it has an error and will exit after you press return. Also their restore program does not tell you when you are done. If you are doing a full restore, the program will continue to ask you for more diskettes after it has restored the entire disk. A more elegant feature would be to tell the user that it is complete and ask if they want to restore more files anyway.

In conclusion, Backup! is a usefull but slighly flawed program. If you have a hard disk, it is necessary. But Michtron should have worked some of the bugs out of it.

TextPro

(a word processor for the ST)

by Rod Swanson

Reprinted from A.E.O.N. Scuttlebutt

Word processors are a dime a dozen (well almost) even for the ST. As far as I am concerned, all of them have some pitfalls as well as some neat features. Then along comes TextPro from Abacus Software.

TextPro is similar to 1st Word in that it is GEM based, and has lots of options/features. You can do most anything with TextPro that you can with 1st Word plus quite a few other things too. For instance, there is a "table of contents" generator and "index" maker. All you do is mark different key words or phrases in your document and use the "contents" and "index" option. It is that easy. You have the usual mark and replace, search and sort, delete blocks and lots of the usual features of a good word processor.

You also have 3 different modes to set up TextPro. 1) DOCUMENT MODE - for entering text that will use page and character manipulation. 2) NON-DOC MODE - for non-formatted straight ASCII characters without any formatting or special printing controls. 3) C-SOURCE - for entering C source code. This mode automatically indents the braces. Each left brace ("{") indents the text 3 characters. Each right brace ("}") justifies the brace to the last left brace entered. When in DOC mode the printer codes are available to you so that you may take advantage of your printer's capabilities. However, this is where my only complaint lies. You cannot see the "special effects" on screen while entering text like you can with 1st Word. For instance, if you want to underline then you enter the appropriate two-stroke key combination and you get a control code on screen (like >>6+<<) but you do not see the effect until you print-preview to the screen or the printer (which, by the way, it does nicely). That is a small price to pay considering the versatility of this product.

There are two other features that make this program stand out above the rest. TextPro has the ability to let you print multiple columns, with few restrictions. The columns must be 10 characters wide or wider, and you can have up to 5 columns. This feature works great. The other feature is the ability to program 30 different macros into the function keys; 10 for normal function keys, 10 for shifted function keys, and 10 for <control> function keys.

TextPro has many more features like: auto-hyphenate, complete page formating, place holding (for merging files), and doc splitting (this neat item lets you take a file that, lets say, was made on a 1040 ST and filled up its memory. Now you want to load it into your 520 ST but with only 1/2 the memory. The program splits the file in 1/2 neatly.)

All in all, I feel that TextPro is an excellent product at its $49.99 retail price. Buy it!

CompuServe Free On-Line Demo
Salt Lake Phone Number 521-2890
or dial the number for your locality
When on-line you may read:

"Connected to CompuServe"

A. Press [control] C
B. User ID 77770,101 [CR]
C. Password FREE-DEMO [CR]

Softworks BASIC

A "re-review" by Larry Fishel
reprinted from The Atari Journal a publication of Atari Microcomputer Users of South Florida

So, here I am again, after lying dormant for eons, with another review of Softworks Basic (the alleged final version this time). (With an apologetic note to the effect that Softworks President, Bob Salita HAS attempted to answer our inquiries, and, and the fact that we have "missed" each other, is OUR fault, Not Softworks! - Ed.) Let me begin, by correcting something that I said last time. I mentioned a data structure, "MAPPED VARIABLES", which made it possible to manipulate any combination of strings, integers and real numbers under a single variable name. I wrote that this structure seemed unique to Softworks Basic, but...I have recently learned that Mapped Variables are actually a simplified version of what Pascal programmers have been calling RECORDS for years now.

Now for the updates. Softworks claims to have corrected all of the bugs listed in my previous review as well as other bugs reported to them later, and have, in fact, conquered the major ones. INPUT statements now work correctly, and GOSUBs within FOR-NEXT loops no longer crash the program. There are, however, several problems still existing. Logarithmic math functions, such as a number raised to the power of .5, are accurate to as little as three digits in some cases. A function called MEM(x) would be very helpful to programmers by returning information about memory used by various segments of the language, user's program and operating system...if it worked, instead of crashing. And finally, the TAB(x,y) function still works in reverse. i.e. TAB(y,x)

Softworks also added one new feature. It allows you to open a channel to the RS-232 port, printer port or the keyboard as a sequential file called AUX:, PRT: or CON:, respectively, This seems to work fine, except for one minor problem: when a channel is opened to the printer for example, a disk file is created labelled PRT:.DAT. Although strange, this seems like a minor flaw unless one tries to print while a write-protected disk (or no disk) is in the drive, in which case the program will crash for no apparent reason.

Finally, the GEM function calls from Softworks Basic all seem to work (I had my doubts earlier), but for most of them, you will need a GEM reference manual.

Regardless if its flaws, Softworks Basic is more reliable and predictable than ST BASIC. I wish I could say more, after keeping our editor waiting so long for this review, but aside from what I've stated above, and in my last review, this basic is simply a compiled (although not particularly fast) version of Microsoft BASIC.

Larry Fishel

WINTER GAMES

for the 520/1040ST computer
Epyx - Sunnyvale, Ca.
sugg. retail: $39.95
reprinted from The Atari Journal a publication of Atari Microcomputer Users of South Florida

From the opening screen, I knew that Epyx was serious about Atari ST software. The graphic detail was excellent, the animation very smooth, and this was obviously NOT a direct port over from the Commodore 64! Winter Games is divided into six popular winter olympic events, and each event requires its own joystick technique

and skills. This variation, plus the fact that the skill level required, just to complete a particular event is fairly intense, guarantees many hours of enjoyment from this program.

The detail work was there also, as for example, on the bobsled (a personal favorite) you can see the people on the bridges as you pass under them. Sound effects are also there, plus many extras. I recommend this game for you if you are a computer sports fan, or just looking for a good action game.

Reviewed by Steve Tearle

Omnitrend's "Universe II"

by Mark Cramer
Reprinted from Pokey Press

When I received my copy of Universe II, I was thrilled. I took the original disk and started out (I did not make a backup of it). After it loaded up I went through the usual orientation stuff, just to see what this was all about. I made the mistake of using two drives, the documentation encourages it. After 5 minutes of going back and forth to the various menus the program told me to put disk A into drive A. I said fine until I found out it was already in drive A. I was stuck! My only recourse was to turn the computer off. The next time the disk was bombed. The disk was crashed and I was fried. Where are those pirated copies when you need them. I bought this game/adventure to play and all I got to do was let my disk grow hair sitting in the closet.

With nothing left to do, I got out the documentation and began reading it. I read the 105 page manual over the course of a week in the reading room. Interesting, to say the least. A lot more sophisticated than the original, old 8-bit copy. I liked the scaled down, easy to understand manual, even though it still was 100+ pages. After reading the docs, I was willing to give it one more try, but I had to wait another 3 weeks to copy disk A from a friend. This time I copied it and put my original in a vault, lead lined for protection. Well since I read the docs I learned that you could copy disk B and disk C onto a double sided disk since they are not protected. Now, in theory, no disk swaps would be necessary (providing you had 2 drives with the second double sided.) This time I managed to last a little longer than before but the result was the same - crash. I had no idea what I was doing wrong so I tried and tried again but it always crashed. I said forget it, send it back, who cares! I took my backup copies and tore the labels off and put them in a stack T.B.F. (to be formatted). One week later I was going through a box and wondered what was on these two disks. I turned one drive on and booted it up. I loaded it up and it worked! Then a brainstorm hit me - it only works with 1 drive! After later modifications of that thesis I came to this conclusion: 2 drives will work providing that disk B is not inserted until the program is loaded. The program when loading had to make your drive snarl. If any of these two things don't happen just start over.

I was planning on doing a review of the program but after I got a substantial way into the game, I tried to go to a starport, a requirement to do anything. Guess what? - I did not get the program that allows you to go down there so I could not continue. From what I saw of the game it sounds like the type I like. Some graphics, but the real power is in the adventure itself. You decide if you will be a miner, trader, raider, etc.... I like the idea but my desire to play it has been greatly diminished by the poor programing of the author. I will wait until a new version is released. I pray that it will be soon.

THE WELL OF SOULS

(801) 485-6349
FoReM ST
24 hrs a day 7 days a week

The Well of Souls is now the OFFICIAL BBS of ASTUN magazine. This dynamic BBS features a 60 megabyte Supra hard drive running on a one megabyte 520 ST. The system contains the latest ST public domain software plus a large archival library, spirited discussion sections and a friendly group of users who are happy to answer questions and help solve problems. Language Forums make for interesting reading and provide a source of programming tips and tricks second to none. Top notch local and national programmers manage these forums and provide guidance and suggestions. 1200 and 2400 baud callers welcome (sorry, we can't support 300 baud due to the number of users).

TWO POPULAR BBS PROGRAMS REVIEWED

Authur Unknown

The Michtron 2.0 BBS has a lot of shortcomings, but foremost is their message base system. You begin with the misguided conception that message base titles and download areas should be the same. The result is up to 16 titles which may contain files and no messages, messages and no files, both, or neither. If you want to keep track of which is which, you will need to write down a list of the "sigs" for every Michtron BBS you call, with descriptions of what is in each sig. Reading messages is even more of a nuisance. The new message command only works once. If you read all new messages in one sig, then it will no longer show new messages in any other sig. The same is true if you want to read messages addressed to you first. If you read your mail first, then the BBS will tell you there are no further new messages. Message numbering is not continous in each sig, it jumps from sig to sig. The BBS will tell you the highest message number you have read, but that is for all the sigs. In essence, Michtron only has one message base for all messages and e-mail - scattering them through 16 sigs has little meaning other then to confuse the user since it is virtually impossible to read new messages in one base at a time (unless of course you always write down the highest message number in each sig). One message base is workable with a small BBS, but makes it difficult to impossible to have specialized message base areas of interest to a subset of your users (such as an ads message base, which usually is not valuable to a long distance caller). Michtron does not allow you to directly read a reply to a message. You must read forward until you get to the reply. There is no way to back up in the message bases, so if after reading a reply you want to comment on the original message, you must use the Quit command, enter the read command, again answer the questions as to whether you want to pause between messages, and read only mail addressed to you, and finally enter the message number. If you didn't happen to write down the message number that you wanted to comment on before you read the reply, then you must read all messages over again in order to find it. It's also important to keep track of how long you've been on the BBS - I've been kicked off in the middle of entering a message because my time limit had expired! You can also leave private mail to someone who doesn't exist - the BBS doesn't bother to check, so if you mispelled someone's name (a typo perhaps?) it will happily save a message that no one will ever read. You may think you have left private mail to someone, but in fact they will never get it if you didn't spell their name correctly.

In version 1.07, when a user uploaded a file, the description the user entered was saved so that users could see both filenames and descriptions. In version 2.0, the SYSOP is expected to make a filename/description list. Just answering mail and checking upload files and updating the download files can consume most if not all of the SYSOP's time. Few SYSOP's will want to take the additional time to create the filename description list and keep that updated, so for most Michtron BBS's there is no description of the files. There is no way to tell which files have been placed on the BBS since you last called, so you must do a "catalog" of the files in each sig. Unlike their earlier version, 2.0 does support CRC downloads, but it does not handle Ymodem file transfers. A Ymodem file transfer takes roughly half the time as a normal CRC transfer if using a telecommunications service like PC Pursuit. Uploading and downloading will work smoothly as long as you don't abort the file transfer. Quite frequently, Michtron will not accept the command to abort the transfer, so you must sit there waiting for it to time out. If you abort an upload

file before the first block (couldn't find your file, or some other reason), Michtron will apparently sit there indefinitely waiting for you. I find that I must upload a "dummy" file, wait for it to send the first block, then abort it and wait for Michtron to time out.

FoReM contains seperate message bases and E-mail areas. When you log on it will tell you if you have E-mail, and you can read that at any time without affecting the pointers to new messages. When you enter the message base area it gives you a list of each message base title, and an indicator if there are new messages in the bases. If you call the BBS infrequently, or call a lot of BBS's, it can be invaluable to get this list to remind you which bases are which (with Michtron, you must exit the message base area, request a sig change, and press RETURN to get the list - then re-enter the message area). Message bases are distinct, so you can ignore the bases that don't interest you. A simple "r/n" command will read new messages. If there is a reply to a message, you can directly read the reply rather then just going on to the next message. You may backup if you want to re-read, or comment on a previous message. Reading all new messages in one base will have no effect on the new message pointer in other bases.

The file system also has distinct download areas. You have a large number of options. You may list filenames with descriptions, byte count, size, etc. taking up 3 lines of information per file. Or you can scan which gives filename and description, 1 per line. Or you can just display all the filenames using all 80 columns of your screen. You may scan or list all files, or just the files that have appeared since the last time you logged on. You may search for a specific file which will check all download areas - very useful if you don't want to upload an existing file. File transfers allow Ymodem for faster uploads/downloads. FoReM accepts the standard cancell command if you abort the file, so you don't have to sit there waiting for the BBS to time out.

Michtron uses single keystroke commands, which work well if you are calling a local BBS. When calling long distance, there is often a delay before the command gets there, with the end result that you can spend a fair amount of time waiting for the BBS to respond. With FoReM, you may string commands together on a single line. For example, if you were in the file section and you wanted to list all the files in a different category, you would type #/l/a where # is the category number. With michtron, you would have to hit s, wait for the prompt to enter sig number, enter the number, wait for the promopt, enter C, wait for the prompt, and enter RETURN. Using a command string rather then having to be prompted for every option, makes it possible to do most things considerably faster then on a Michtron BBS.

Editors Notes

Several of our regular features have been left out this month. We decided instead to include more information on the subject of telecomunications. Most of the regular features will be reestablished in upcoming issues.

ASTUN would like to hear more from you. Please drop us a note letting us know what you would like to see in our pages. If you have questions, and/or answers about use of the ST computer let us know so we can pass the information on to our members. We will answer the questions of general interest in future issues of ASTUN.

As always, we wish to thank you for your support. We also wish to offer a special thank you to the people who contribuite to this publication. This includes the authors of articles as well as the clubs and newsletters who exchange publications with us.

QUALITY ST SOFTWARE

from MIGRAPH

LabelMaster

Once you try LabelMaster you'll never use plain labels again! This great program is GEM based and contains a Graphic Editor to create your own designs and a mailing list manager. Packed with features, PLUS 100 ready-to-use designs. With LabelMaster the possibilities for home and business are endless.....$39.95

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Here's the program you've been waiting for to create: flyers, newsletters, forms illustrations, floor plans, landscape designs, ads like this one, and much more! Easy-Draw is an object- oriented drawing program that's great for Desktop Publishing because it loads text files. So now you can combine text from other programs with drawings from Easy-Draw and place them on a page in any format. Easy-Draw does away with messy paste-ups and produces camera ready copy. Complete with features like zoom, edit polyline, flip and mirror, 39 patterns and more, Easy-Draw is the right tool for you! Clip Art and Fonts coming soon.....$79.95

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The Atari ST BBS "Hotlist"
(Edition 2.0 - December 1st, 1986)
Bulletin Board System Nationwide Listing
[Courtesy of The Hotline BBS in Arlington, Virginia]

State	BBS Name		Phone Number	Baud	Remarks
AK	Hole in the Wall		907-338-0348	3/12	8-Bit System
AR	LRBBS		501-224-9454	3/12	ST-Unk Software
AZ	Bookman's ST Emporium		602-745-2837	3/12	ST-Unk Software
CA	Fresno ST User Group		209-292-1777	3/12	ST-Unk Software
CA	Mount Olympus		209-526-9889	3/12	FoReM ST
CA	PC Heaven	***	213-374-7929	3/12	FoReM ST
CA	MIDI World Network	***	213-826-4288	3/12	ST-Unk Software
CA	The Mid-Cities Connection	***	213-867-1943	3/12	Michtron ST
CA	Star Fleet Academy		408-244-1614	3/12/24	ST-Unk Software
CA	Atari Shoppe BBS		408-249-4029	3/12	ST-Unk Software
CA	Iron Works		408-257-7147	3/12/24	ST-Unk Software
CA	X-Factor		408-279-8086	3/12	ST-Unk Software
CA	Ace Connection		408-353-4531	3/12	ST-Unk Software
CA	OSS, Inc.		408-446-3451	3/12	8-Bit System
CA	Atari Corporation		408-745-5308	3/12	Michtron ST
CA	Atari Corporation		408-475-4758	3/12	Michtron ST
CA	Atari Corporation		408-745-2642	3/12	Michtron ST
CA	ST Users BBS	***	415-221-9505	3/12	Michtron ST
CA	WelchNet	***	415-664-2811	3/12	Other System
CA	SLCC BBS		415-782-4402	3/12	ST-Unk Software
CA	Liad BBS		415-939-3586	3/12	ST-Unk Software
CA	Castle BBS		415-939-5606	3/12	ST-Unk Software
CA	STrategic Command		415-939-6275	3/12	Michtron ST
CA	Amber BBS		415-964-0584	3/12	ST-Unk Software
CA	Atari Line Express		619-282-6608	3/12	ST-Unk Software
CA	Stallion BBS		619-428-0319	3/12	ST-Unk Software
CA	Ridgecrest BBS		619-375-6750	3/12	FoReM ST
CA	ST*SIG Online Edition		619-726-4419	3/12	ST-Unk Software
CA	SMART		619-741-2369	3/12	ST-Unk Software
CA	STATE (ST Applications Mag.)		707-585-2194	3/12	8-Bit System
CA	Pipeline		805-526-5660	3/12	8-Bit System
CA	Camp Crystal Lake		818-352-0046	3/12	ST-Unk Software
CA	The Way BBS		818-363-3505	3/12	Other System
CA	Exceptional Software BBS		818-769-9538	3/12	ST-Unk Software
CA	Atari 16+32		818-996-9565	3/12	ST-Unk Software
CO	Electric Land	***	303-447-2227	3/12	Other System
CO	Mycroft	***	303-699-7195	3/12	Other System
CT	Pyrotechnics BBS		203-287-0780	3/12	ST-Unk Software
CT	Skyline BBS		203-488-0816	3/12/24	FoReM ST
CT	Excalibur		203-776-1411	3/12	ST-Unk Software
CT	Hi-Tech BBS		203-776-2850	3/12/24	FoReM ST
FL	SST BBS (SST Systems)		305-383-0353	3/12	ST-Unk Software
FL	National Users Group BBS		305-383-1413	3/12	ST-Unk Software
FL	Battlestar Atarian		305-488-0480	3/12	FoReM ST
FL	P.D. BBS		305-574-9483	3/12/24	Michtron ST
FL	A.C.C.P.B.		305-585-7879	3/12	ST-Unk Software
FL	The STarship BBS		305-658-1425	3/12	Michtron ST
FL	The Quill		305-724-2303	3/12	Other System
FL	The Disk Bank		305-774-8986	3/12/24	ST-Unk Software

FL	LBBS		305-788-6226	3/12	8-Bit System
FL	A.S.U.G.		305-793-9385	3/12	ST-Unk Software
FL	McDonald Development Group		305-886-1632	3/12	ST-Unk Software
FL	Rainbow Computer Center		305-896-6707	3/12	ST-Unk Software
FL	Computer Chip BBS		813-351-3604	3/12/24	Other System
FL	Sota Computers		813-924-4590	3/12	Other System
GA	BaSTille BBS	***	404-627-1995	3/12	Michtron ST
HI	Maximum Security		808-422-2247	3/12	Michtron ST
ID	Hig's Hideout		208-233-7742	3/13	Michtron ST
IL	StarNet (Illiana ACE)		217-267-3530	3/12	8-Bit System
IL	JAF Data Systems BBS		312-238-4328	3/12/24	Other System
IL	SCAT BBS	***	312-462-9844	3/12	8-Bit System
IL	The Remote Atari BBS	***	312-587-1349	3/12	ST-Unk Software
IL	Dark Side of the Moon	***	312-639-1993	3/12	FoReM ST
IL	Captain Video	***	312-725-6232	3/12	Michtron ST
IL	SunDog BBS	***	312-759-9101	3/12	ST-Unk Software
IL	ChicagoLand SUG	***	312-889-1240	3/12	Other System
IL	Stash BBS	***	312-980-5617	3/12	Michtron ST
IL	Porthole to Oblivion		815-838-3615	3/12	ST-Unk Software
IN	Hart City BBS		219-262-3980	3/12	FoReM ST
IN	Megahertz		812-379-1162	3/12	ST-Unk Software
KS	KC Atari		816-353-7541	3/12	ST-Unk Software
KS	Bloom County		913-842-5011	3/12/24	Other System
LA	Outlet's BBS		504-277-3541	3/12	ST-Unk Software
LA	Bit Map BBS		504-394-6224	3/12	ST-Unk Software
LA	American Networks I & II		504-436-7222	3/12/24	Multi-line
MA	FoReM ST (Commnet Systems)		617-620-0903	3/12/24	FoReM ST
MA	CompuClub BBS		617-788-0024	3/12	Other System
MA	Freeport Express	***	617-825-3124	3/12	Other System
MD	Tanj BBS	***	301-251-0675	3/12	8-Bit System
MD	Mission Impossible	***	301-384-6153	3/12	FoReM ST
MD	Blackbird BBS	***	301-445-5496	3/12/24	FoReM ST
MD	The Pentagon	***	301-464-0948	3/12	8-Bit System
MD	Theatre of Pain	***	301-490-5988	3/12	8-Bit System
MD	The Funhouse	***	301-540-8379	3/12	FoReM ST
MD	Vanguard BBS	***	301-577-3569	3/12	Michtron ST
MD	ST Hospital	***	301-654-0565	3/12/24	FoReM ST
MD	Cal Com BBS (Cal Com, Inc)	***	301-681-8933	3/12	ST-Unk Software
MI	Griffon BBS (Michtron, Inc.)		313-332-5452	3/12	Michtron ST
MI	Club II BBS		313-334-8877	3/12	ST-Unk Software
MI	Surfboard BBS	***	313-547-5671	3/12	FoReM XE
MI	Ann Arbor BBS		313-665-7286	3	ST-Unk Software
MI	Tony's Corner/Collosus BBS	***	313-754-1131	3/12	ST-Unk Software
MI	MACE BBS		313-978-1685	3/12	8-Bit System
MI	SuperServe		616-791-2109	3/12	ST-Unk Software
MN	Spike Master		612-374-3232	3/12	FoReM ST
MO	Parthanon		314-522-1460	3/12	FoReM ST
MO	A.U.R.A.		314-928-0598	3/12	FoReM ST
MO	KC Atari Central		816-353-7541	3/12	ST-Unk Software
MO	Atari Outpost		816-765-1150	3/12	FoReM ST
MS	Coastal Area BBS		601-388-3490	3/12	Other System
NC	East Coast Systems		704-529-0375	3/12	FoReM ST
NE	Atari-O!		402-592-4435	3/12/24	FoReM ST
NJ	The Border BBS	***	201-549-8419	3/12	Michtron ST
NJ	Fizban's Towers		201-583-5758	3/12	Michtron ST
NJ	Dark Side		201-782-3727	3/12/24	ST-Unk Software
NJ	AtlantiST		201-793-0996	3/12	Michtron ST
NJ	Backstage BBS	***	201-944-1996	3/12	ST-Unk Software
NJ	ST Wizard		609-627-4556	3/12	FoReM ST

NV	520 ST Systems		702-363-8111	3/12	ST-Unk Software
NV	Rebel BBS		702-435-0786	3/12	Other System
NV	Computer World		702-735-7264	3/12	Other System
NV	Atari Tavern		702-826-9633	3/12	FoReM ST
NY	Fever ST BBS	***	212-562-5161	3/12	FoReM ST
NY	QMI BBS (QMI, Inc)		315-457-7216	3/12	ST-Unk Software
NY	Strike Force		516-368-2476	3/12	FoReM ST
NY	ST Realm		516-536-1068	3/12/24	ST-Unk Software
NY	Atari Link		516-924-1281	3/12/24	FoReM ST
NY	Atari Apex BBS		716-458-2638	3/12/24	FoReM ST
NY	Crazy Train		716-741-9822	3/12	ST-Unk Software
NY	World of Krypton		718-373-0623	3/12	ST-Unk Software
NY	IMF BBS		718-476-9659	3/12	8-Bit System
NY	Dateline (B.A.S.I.C.)		718-648-0947	3/12	ST-Unk Software
NY	Imperium Galactic		718-851-5785	3/12/24	FoReM ST
NY	Beehive BBS		718-852-2823	3/12	FoReM ST
NY	Hunter's Hangout		718-897-5578	3/12	Michtron ST
NY	The Jolly ST		817-634-7480	3/12	ST-Unk Software
NY	The Telephone Company		817-778-2506	3/12	Michtron ST
NY	The I.R.S. BBS		914-225-2374	3/12	FoReM ST
OH	Flag City ST		419-423-0206	3/12	FoReM ST
OH	Powerhouse		419-472-6835	3/12	FoReM ST
OH	InfoNet		513-435-8381	3/12	Other System
OH	The Scan Line		513-829-0389	3/12	Michtron ST
OH	The Pixel Palace		513-856-9742	3/12	ST-Unk Software
OK	M*A*S*H		405-743-0651	3/12	Michtron ST
OR	Atarian		503-245-9730	3/12	8-Bit System
OR	I.B. BBS		503-292-1321	3/12	FoReM ST
OR	A.C.E. of Eugene		503-343-4352	3/12/24	8-Bit System
OR	SS BBS		503-479-9516	3/12	Other System
OR	The Machine		503-747-8758	3/12	8-Bit System
OR	Data Dogs BBS		503-935-4605	3/12	FoReM ST
PA	ST Emporium	***	215-757-7308	3/12/24	FoReM ST
PA	Cornerstone BBS		215-775-5684	3/12	Michtron ST
PA	Intentional Intellect BBS		215-791-2304	3/12/24	FoReM ST
PA	Atari Elite		412-384-5609	3/12	ST-Unk Software
PA	The Underground BBS		717-735-8885	3/12	FoReM ST
RI	Narragansett Bay BBS		401-683-9115	3/12	FoReM ST
SC	Springdale BBS		803-794-3307	3/12	ST-Unk Software
SD	M.U.G. BBS		605-226-1590	3/12	ST-Unk Software
TN	Troll's Cave		615-242-7909	3/12/24	FoReM ST
TN	Computerama BBS		615-892-1454	3/12	ST-Unk Software
TX	Principia Discordia ST		512-444-1840	3/12	Michtron ST
TX	Trade/Sell BBS of Texas	***	713-242-6041	3/12	Other System
TX	Computers to Grow BBS	***	713-271-0571	3/12/24	Other System
TX	Atari ST	***	713-541-9160	3/12	Michtron ST
TX	HASTE	***	713-955-9532	3/12/24	8-Bit System
TX	ST BBS	***	713-995-0843	3/12	ST-Unk Software
TX	Dal-Ace BBS		817-267-4913	3/12	ST-Private BBS
TX	Church Mouse BBS		817-284-5725	3/12	Michtron ST
TX	Jenkins Computer Store (STEP)		915-751-7837	3/12/24	ST-Unk Software
UT	The Nuthouse		801-377-1617	3/12	ST-Unk Software
UT	Wizard's Workshop		801-789-6439	3/12/24	FoReM ST
UT	Heart of Gold		801-964-9764	12/24	FoReM ST
UT	Well of Souls		801-485-6349	12/24	FoReM ST
VA	Gallifrey	***	703-256-3223	3/12	FoReM ST
VA	Rivendell	***	703-437-9380	3/12	FoReM ST
VA	WAACE ST (Novatari)	***	703-569-3227	3/12	FoReM ST/Fee
VA	The Hotline/HOTLIST Author	***	703-683-3944	3/12	FoReM PC

WA	Bytes & Pieces	***	206-241-8963	3/12	FoReM ST
WA	Foundation & Empire BBS	***	206-323-1330	3/12	FoReM ST
WA	Asylum BBS		206-347-1008	3/12	FoReM ST
WA	ST Bit Bucket	***	206-363-8592	3/12	FoReM ST
WA	DOS File ST BBS	***	206-367-3453	3/12	ST-Unk Software
WA	Suburbia 1200	***	206-488-7496	3/12	FoReM ST
WA	SIG 16		206-636-3403	3/12	ST-Unk Software
WA	Bauhaus BBS	***	206-672-0956	3/12	FoReM ST
WA	Xanth BBS	***	206-682-8039	3/12/24	FoReM ST
WA	Space Butlers	***	206-941-2824	3/12	FoReM ST
WI	After Hours BBS (7PM-8AM)		414-235-9164	3/12	Michtron ST
WI	Atari Havoc		414-545-6230	3/12	FoReM ST

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Canadian ST BBS's:

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CAN	68000 Mice	403-242-0706	3/12	FoReM ST
CAN	ST Connection	416-276-4101	3/12	FoReM ST
CAN	Gold Board (12 Pm-8 Pm)	416-691-4859	3/12	ST-Unk Software
CAN	FASTER	514-489-0680	3/12	ST-Unk Software
CAN	ST Base One	514-671-5719	3/12	ST-Unk Software
CAN	S.T.A.R.S.	519-472-1638	3/12	FoReM ST
CAN	Natl Capital Atari Users Gp	613-231-3411	3/12/24	FoReM ST
CAN	Ali Computer	613-745-6372	3/12	ST-Unk Software
CAN	Media Land	613-820-7326	3/12	FoReM ST
CAN	Husky BBS	705-949-7366	3/12	ST-Unk Software

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"***" - Denotes that the BBS is accessible via Telenet's PC Pursuit.
PC Pursuit Info: (Data) 1-800-835-3001
(Data) Va 703-689-2987
(Voice) 1-800-TELENET 8 Am-5 Pm EST

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Notes from The Author:

The Hotlist has been researched as thoroughly as possible and the author does not make any guarantees as to the accuracy of any BBS or telephone number listed.

This List continues to be the most complete listing of Atari ST BBS's available and will be updated on a quarterly basis (next edition will be issued on March 1st, 1987).

I need everyone's assistance in keeping this list as accurate as possible! PLEASE send me any information you have, including additions, corrections, and deletions to any of the accounts listed below. I would like the next Edition to include clearer information on BBS Software, Version number, Baud Rates, etc. If you find this list useful, please take a few minutes to send me any information you might have and I'll continue to issue The Hotlist for you free of charge. Thanks!!

-- Tom Zelinski

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How to Get the Most Out of CompuServe

A Book Review By Eric Plent
Reprinted from Micros of Monmouth

Picture this: You just got your modem, and you are in a hurry to try it out. You have heard of this service called CompuServe from your friends and can't wait to try it. Quickly, you boot the modem's software and call the number. Connected! .....But, what's this? ..Nothing is happening! ..What is this? ..Pressing <RETURN> does nothing, so you just wait..nothing. You log off without doing anything.

This is where How to Get the Most Out of CompuServe comes in. By reading this book you can get all the information you need to start using CompuServe right away. In the above situation, the book would have told you to hit <CONTROL C> to get going and you would have been using CompuServe right then and there.

I hear a lot of people say that they would like to try CompuServe, but have heard stories of getting lost in all the menus and having to remember all the commands to get it to do anything. I too was one of those people until I saw this book. From the minute I opened it, I knew that I had to have it.

The thing about this book is that it is not just a MANUAL to CompuServe, but a COURSE on how to use Compuserve. In it you will find little guided tours of the system. From logon to logoff, you will know where you are and how to stop. Talk about a saving on the phone bills.

Really though, the authors, Charles Bowen and David Peyton, have done a great job in getting all this information into one book and it is worth the $16.95 price tag.

so if you have always wanted to try CompuServe, but never were crazy about the idea of getting lost in all the menus, you should get this book. It is the best "road map" for CompuServe I have seen.

How to Get the Most Out of CompuServe
Bantam Books, Inc.
666 Fifth Ave.
NY, NY 10103

Winter Games

by Eli Tomlinson
Reprinted from JACG Newsletter

Although it seems a little late in time, I just recently got a chance to play some of the games written for the Atari ST. I must begin by saying that I was very impressed. The first program I tried was Winter Games by Epyx. It probably has the best graphics of any game I have ever played. The backgrounds are done with great detail and the animation is excellent. Winter Games is a great demonstration of what the Atari ST computers are capable of. Winter Games consists of six events: bobsledding, ski jumping, figure skating, free style skating, hot dog, and the biathalon. The game can be played with one to eight players, and each player can represent one of a variety of different countries. The game also allows you to compete in, or practice, any single event. Winter Games also keeps track of world records, which are the best scores in each of the events. So far I haven't grown tired of this one. It is a lot of fun to compete with a whole bunch of friends, or just sit back and play a single event until you can break the current world record. If you like arcade games at all, I think you will be very impressed with Winter Games.

PC PURSUIT

(A Low cost alternitive to expensive phone bills and high cost networks)

Small to medium size businesses and home PC users can use PC Pursuit as a cost-effective alternative to long distance direct dial or WATS for data communications. For a flat $25/month, you can make an unlimited number of long distance calls during the evenings and weekends. The same high quality service is also available during the business day for low hourly rates of $10.50/hr or $14/hr, depending upon your access location. There is also a one-time registration fee of $25.

YOU can access PC Pursuit from ANY city or town ACROSS THE U.S. which has Telenet local dial-in access - and that includes HUNDREDS of cities !!
It is IMPORTANT for PC users - LIKE YOU - to understand that access to PC Pursuit is NOW available from just about ANYWHERE across the U.S.

With PC PURSUIT, you can explore a wealth of free resources and even discover more uses for your PC. In any of the locations accessible to PC PURSUIT, you have the ability to:

* communicate with friends and associates on-line,

* download and upload public domain software from thousands of Bulletin Board Systems in the 14 PC PURSUIT cities,

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The features and benefits offered by PC PURSUIT SERVICE include:

Portability:
---------- Because the service is widely accessible, you can use PC PURSUIT at home, at the office, or travelling.

Accessibility:
------------ The service can be accessed from nearly 17,000 local telephone exchanges via the Telenet network. You can dial thousands of free databases at 300 and 1200 bps in 14 major cities across the nation, 24 hours a day.

Convenient Billing:
---------- All PC PURSUIT service charges are billed directly to your VISA, MASTERCARD or AMERICAN EXPRESS account.

Nonstop Support:
---------- As with all other Telenet services, The Telenet Network Control Center provides 24-hour management to ensure reliable data transmission.

START SAVING TODAY AND JOIN THE THOUSANDS OF PC USERS FROM COAST TO COAST WHO ARE ALREADY ENJOYING THE COST-EFFECTIVE WORLD OF PC COMMUNICATIONS THROUGH PC PURSUIT.

PC Pursuit Service Availability

PC Pursuit users can make calls to any local exchange in the metropolitian areas within these area codes.

ATLANTA	404	BOSTON	617	CHICAGO	312
DALLAS	214	DENVER	303	DETROIT	313
HOUSTON	713	LOS ANGELES	213	NEWARK	201
NEW YORK	212	PHILADELPHIA	215	SAN FRANCISCO	415
SEATTLE	206	WASHINGTON, D.C.	202		

For telephone numbers local to Washington D.C. but located in northern Virginia (703) or southern Maryland (301), you can use DIAL202/xx.

Other city area codes that will be accessible via PC Pursuit are: Work is presently underway to add these city area codes.

PORTLAND	503	TAMPA	813	MIAMI	305
SAN JOSE	408	GLENDALE	818	MINNEAPOLIS	612
PHOENIX	602	CLEVELAND	216	SALT LAKE CITY	801
MILWAUKEE	414	RESEARCH TRIANGE PARK	919		

SOME COMMON QUESTIONS AND ANSWERS

1) CAN I USE VOICE ACROSS PC PURSUIT?

ANS: Telenet is for DATA communications only. Telenet is a part of US SPRINT, and we recommend SPRINT service for your voice long-distance needs (call 800-521-4949). You will nonetheless see more integration of voice and data service coming from US SPRINT as a result of our new joint-venture.

2) I HAVE FRIENDS IN RICHMOND, VA. AND PROVIDENCE, R.I. WILL PC PURSUIT EVER PROVIDE OUTDIAL SERVICE TO THOSE AREAS?

ANS: Yes, Telenet Engineering is developing a method to enable all U.S. Telenet cities to be bi-directional in dialing. That is, calls could be made FROM any Telenet city TO any Telenet city. That is to be THE ultimate PC Pursuit service - with access to and from thousands of cities!! Hope to have this available by year end 1987. In the mean while, we will grow PC Pursuit from 14 to 25 to 50 cities, etc.

3) WHEN IS 2400 BPS GOING TO BE AVAILABLE WITH PC PURSUIT?

ANS: Originally, it was to be available this fall '86. Development delays now have deployment scheduled for 1st Qtr 1987. We will give you an update in the next newsletter.

NUMBERS TO CALL FOR INFO/HELP

(800) 835-3001 - On-line BBS User Guide (24 hrs)
(800) TELENET - PC Pursuit info, registrations (voice, 8-5pm)
(800) 336-0437 - Customer Service (voice, 24 hrs)

GEnie Information Service

GEnie, the General Electric Information Service, is the newest commercial online service and also the cheapest at $5 an hour, even for 1200 baud modems.

The overall feeling of GEnie is very friendly with frequent prompts and helpful instructions. From the moment new users log on they're guided through the steps of setting up terminal defaults and presented with the main menu.

GEnie provides the usual online services like electronic mail, news and commentary, articles, electronic magazines, a CB simulator and national real-time conferences. There is also a Shop and Swap, where you can buy from or sell to other GEnie users on a national BBS; and the Game Room, where you can play Stellar Warrior, a multi-player game by Kesmai that sounds similar to CompuServe's MegaWars, and many other single or multi-player games.

Instead of SIGs (special interest groups), GEnie has RoundTables where owners of various brands of computers or special hobbies can gather. At the Atari RoundTable you can select from the bulletin board, a place to post messages to all RoundTable members; a real-time conference with several 'conference rooms' including the general room where there is a scheduled group conference every Wednesday night at 10pm, Eastern time; and a public domain software libary.

The Atari software library is of fair size, presently containing about 200 public domain programs. It is growing fast, however because GEnie provides free upload time. This policy was scheduled to expire on May 31, but has been so successful that GEnie may extend it. The Atari RoundTable software library has 11 categories, including one specifically for the ST. Downloading and uploading is where GEnie really shines with the fastest X-MODEM protocol transfers I have ever seen.

Bob Retelle, the system operator (sysop) on the Atari RoundTable, got his first sysop experience on local bulletin boards in Michigan, where he lives, and then became a co-sysop on the Delphi Atari SIG. Bob had become acting chief sysop on the Delphi SIG by late last year, when he was approached about GEnie's Atari RoundTable. You'll find bob very helpful and he adds to the Atari RoundTable's warm atmosphere.

I have only a few nits to pick about GEnie. In conference mode there is no command comparable to CompuServe's [CONTROL][Y] which redisplays the line you have been typing if you get run over by somebody else's message. It is a good idea to use a software package with an edit window while in conference mode on this service. I was able to participate without either of these tools, but they would have been helpful. GEnie also defaults to half duplex, which I don't care for. You can get full duplex, however, if you type a [CONTROL][R] after the U$ = prompt before you enter your user number.

Overall, I liked GEnie a lot andI expect to spend a lot of time using this service.

GEnie
General Electric Information Service
401 North Washington Street Rockville, MD 20850
(800) 638-9636
$5 per hour - Evening/Weekend/Holiday (300/1200 Baud)

XMODEM/YMODEM PROTOCOL REFERENCE

A compendium of documents describing the
XMODEM and YMODEM file transfer protocols.

Compilation by Chuck Forsberg.

CONTENTS

1. ROSETTA STONE
2. YET ANOTHER PROTOCOL?
   2.1 Some Messages from the Pioneer
3. XMODEM PROTOCOL ENHANCEMENTS
   3.1 Graceful Abort
   3.2 CRC-16 Option
   3.3 XMODEM-1k 1024 Byte Packet
4. YMODEM Batch File Transmission
   4.1 XMD/IMP Exceptions to YMODEM
5. YMODEM-g File Transmission
6. XMODEM PROTOCOL OVERVIEW
   6.1 Definitions
   6.2 Transmission Medium Level Protocol
   6.3 File Level Protocol
   6.4 Programming Tips
7. XMODEM/CRC Overview
   7.1 CRC Calculation
   7.2 CRC File Level Protocol Changes
   7.3 Data Flow Examples with CRC Option
8. MORE INFORMATION
9. Document Revisions
10. YMODEM Programs

LIST OF FIGURES

Figure 1. 1024 byte Packets
Figure 2. Mixed 1024 and 128 byte Packets
Figure 3. YMODEM Batch Transmission Session
Figure 4. YMODEM filename packet transmitted by sz
Figure 5. YMODEM Header Information used by various programs
Figure 6. YMODEM-g Transmission Session
Figure 7. XMODEM Message Block Level Protocol
Figure 8. Data flow including Error Recovery
Figure 9. Message Block Level Protocol, CRC mode
Figure 10. Example of CRC Calculation written in C
Figure 11. Data Flow: Receiver has CRC Option, Sender Doesn't
Figure 12. Receiver and Sender Both have CRC Option

1. ROSETTA STONE

Here are some definitions which reflect the current vernacular in the computer media. The attempt here is identify the file transfer protocol rather than specific programs.

XMODEM refers to the original 1979 file transfer etiquette introduced by Ward Christensen's 1979 MODEM2 program. It's also called the MODEM or MODEM2 protocol. Some who are unaware of MODEM7's unusual batch file mode call it MODEM7. Other aliases include "CP/M Users' Group" and "TERM II FTP 3". This protocol is supported by every serious communications program because of its universality, simplicity, and reasonable performance.

XMODEM/CRC replaces XMODEM's 1 byte checksum with a two byte Cyclical Redundancy Check (CRC-16), giving modern error detection protection.

XMODEM-1k Refers to the XMODEM/CRC protocol with 1024 byte data blocks.

YMODEM refers to the XMODEM/CRC (optional 1k blocks) protocol with the batch transmission described below.

ZMODEM uses familiar XMODEM/CRC and YMODEM technology in a new protocol that provides reliability, throughput, file management, and user amenities appropriate to contemporary data communications.

2. YET ANOTHER PROTOCOL?

Since its development half a decade ago, the Ward Christensen modem protocol has enabled a wide variety of computer systems to interchange data. There is hardly a communications program that doesn't at least claim to support this protocol.

Recent advances in computing, modems and networking have revealed a number of weaknesses in the original protocol:

+ The short block length caused throughput to suffer when used with timesharing systems, packet switched networks, satellite circuits, and buffered (error correcting) modems.
+ The 8 bit arithmetic checksum and other aspects allowed line impairments to interfere with dependable, accurate transfers.
+ Only one file could be sent per command. The file name had to be given twice, first to the sending program and then again to the receiving program.
+ The transmitted file could accumulate as many as 127 extraneous bytes.
+ The modification date of the file was lost.

A number of other protocols have been developed over the years, but none have displaced XMODEM to date:

+ Lack of public domain documentation and example programs have kept proprietary protocols such as MNP, Blast, and others tightly bound to the fortunes of their suppliers.
+ Complexity discourages the widespread application of BISYNC, SDLC, HDLC, X.25, and X.PC protocols.
+ Performance compromises and moderate complexity have limited the popularity of the Kermit protocol, which was developed to allow file transfers in environments hostile to XMODEM.

The XMODEM protocol extensions and YMODEM Batch address these weaknesses while maintaining XMODEM's simplicity.

YMODEM is supported by the public domain programs YAM (CP/M), YAM(CP/M-86), YAM(CCPM-86), IMP (CP/M), KMD (CP/M), rz/sz (Unix, Xenix, VMS, Berkeley Unix, Venix, Xenix, Coherent, IDRIS, Regulus). Commercial implementations include MIRROR, and Professional-YAM. Ill Communications programs supporting these extensions have been in use since 1981.

The 1k packet length (XMODEM-1k) described below may be used in conjunction with YMODEM Batch Protocol, or with single file transfers identical to the XMODEM/CRC protocol except for minimal changes to support 1k packets.

Another extension is simply called the g option. It provides maximum throughput when used with end to end error correcting media, such as X.PC and error correcting modems, including the emerging 9600 bps units by Electronic Vaults and others.

To complete this tome, Ward Christensen's original protocol document and John Byrns's CRC-16 document are included for reference.

References to the MODEM or MODEM7 protocol have been changed to XMODEM to accomodate the vernacular. In Australia, it is properly called the Christensen Protocol.

2.1 Some Messages from the Pioneer
#: 130940 80/Communications
25-Apr-83 18:38:47Sb: ay protocol
Fm: Ward Christensen 76703,302
(EDITED)To: all
Be aware the article[2] DID quote me correctly in terms of the phrases like "not robust", etc.
It was a quick hack I threw together, very unplanned (like everything I do), to satisfy a personal need to communicate with "some other" people.
ONLY the fact that it was done in 8/77, and that I put it in the public domain immediately, made it become the standard that it is.
I think its time for me to
(1) document it; (people call me and say "my product is going to include it - what can I reference'", or "I'm writing a paper on it, what do I put in the bibliography") and
(2) propose an "incremental extension" to it, which might take "exactly" the form of Chuck Forsberg's YAM protocol. He wrote YAM in C for CP/M and put it in the public domain, and wrote a batch protocol for Unix[3] called rb and sb (receive batch, send batch), which was basically XMODEM with (a) a record 0 containing filename date time and size(b) a 1K block size option (c) CRC-16.
He did some clever programming to detect false ACK or EOT, but basically left them the same.
People who suggest I make SIGNIFICANT changes to the protocol, such as "full duplex", "multiple outstanding blocks", "multiple destinations" etc, etc don't understand that the incredible simplicity of the protocol is one of the reasons it survived to this day in as many machines and programs as it may be found in!
Consider the PC-NET group back in '77 or so - documenting to beat the band- THEY had a protocol, but it was "extremely complex", because it tried to be "all things to all people" - i.e. send binary files on a 7-bit system, etc. I was not that "benevolent". I (emphasize > I <) had an 8-bit UART,so "my protocol was an 8-bit protocol", and I would just say "sorry" to people who were held back by 7-bit limitations.

Block size: Chuck Forsberg created an extension of my protocol, called YAM, which is also supported via his public domain programs for UNIX called rb and sb - receive batch and send batch. They cleverly send a"block 0" which contains the filename, date, time, and size. Unfortunately, its UNIX style, and is a bit weird[4] - octal numbers, etc. BUT, it is a nice way to overcome the kludgy "echo the chars of the name" introduced with MODEM7. Further, chuck uses CRC-16 and optional 1K blocks. Thus the record 0, 1K, and CRC, gave it a "pretty slick new protocol" which is not significantly different from my own.
Also, there is a catchy name - YMODEM. That seems to mean that it is the "next thing after XMODEM", and to others that it is the Y(am)MODEM protocol. I don't want to emphasize that too much - out of fear that other mfgrs might think it is a "competitive" protocol, rather than an"unaffiliated" protocol.
Chuck is currently selling a much-enhanced version of his CP/M-80 C program YAM, calling it Professional Yam, and it's for the PC - I'm using it right now. VERY slick! 32K capture buffer,script, scrolling, previously captured text search, plus built-in commands for just about everything - directory (sorted every which way), XMODEM, YMODEM, KERMIT, and ASCII file upload/download, etc. You can program it to "behave" with most any system - for example when trying a number for CIS it detects the "busy" string back from the modem and substitutes a diff phone # into the dialing string and branches back to try it.

3. XMODEM PROTOCOL ENHANCEMENTS
This chapter discusses the protocol extensions to Ward Christenson's 1982 XMODEM protocol description document.
The original document recommends the user be asked whether to continue trying or abort after 10 retries. Most programs no longer ask the operator whether he wishes to keep retrying. Virtually all correctable errors are corrected within the first few retransmissions. If the line is so bad that ten attempts are insufficient, there is a significant danger of undetected errors. If the connection is that bad, it's better to redial for a better connection, or mail a floppy disk.

3.1 Graceful Abort
The YAM and Professional-YAM X/YMODEM routines recognize a sequence of two consecutive CAN (Hex 18) characters without modem errors (overrun,framing, etc.) as a transfer abort command. This sequence is recognized when YAM is waiting for the beginning of a packet or for an acknowledge to one that has been sent. The check for two consecutive CAN characters virtually eliminates the possibility of a line hit aborting the transfer. YAM sends eight CAN characters when it aborts an XMODEM, YMODEM, or IMODEM protocol file transfer. Pro-YAM then sends eight backspaces to delete the CAN characters from the remote's keyboard input buffer, in case the remote had already aborted the transfer and was awaiting a keyboarded command.

3.2 CRC-16 Option
The IMODEM protocol uses an optional two character CRC-16 instead of the one character arithmetic checksum used by the original protocol and by most commercial implementations. CRC-16 guarantees detection of all single and double bit errors, all errors with an odd number of error bits, all burst errors of length 16 or less, 99.9969% of all 17-bit error bursts, and 99.9984 per cent of all possible longer error bursts. By contrast, a double bit error, or a burst error of 9 bits or more can sneak past the XMODEM protocol arithmetic checksum.
The XMODEM/CRC protocol is similar to the XMODEM protocol, except that the receiver specifies CRC-16 by sending C (Hex 43) instead of NAK when requesting the FIRST packet. A two byte CRC is sent in place of the one byte arithmetic checksum.
YAM's c option to the r command enables CRC-16 in single file reception, corresponding to the original implementation in the MODEM7 series programs. This remains the default because many commercial communications programs and bulletin board systems still do not support CRC-16, especially those written in Basic or Pascal.
IMODEM protocol with CRC is accurate provided both sender and receiver both report a successful transmission. The protocol is robust in the presence of characters lost by buffer overloading on timesharing systems.
The single character ACK/NAK responses generated by the receiving program adapt well to split speed modems, where the reverse channel is limited to ten per cent or less of the main channel's speed.
XMODEM and YMODEM are half duplex protocols which do not attempt to transmit information and control signals in both directions at the same time. This avoids buffer overrun problems that have been reported by users attempting to exploit full duplex asynchronous file transfer protocols such as Blast.
Professional-YAM adds several proprietary logic enhancements to XMODEM's error detection and recovery. These compatible enhancements eliminate most of the

bad file transfers other programs make when using the XMODEM protocol under less than ideal conditions.

3.3 XMODEM-1k 1024 Byte Packet
The choice to use 1024 byte packets is expressed to the sending program on its command line or selection menu.[5] 1024 byte packets improve throughput in many applications, but some environments cannot accept 1024 byte bursts, especially minicomputers running 19.2kb ports.
An STX (02) replaces the SOH (01) at the beginning of the transmitted block to notify the receiver of the longer packet length. The transmitted packet contains 1024 bytes of data. The receiver should be able to accept any mixture of 128 and 1024 byte packets. The packet number is incremented by one for each packet regardless of the packet length.
The sender must not change between 128 and 1024 byte packet lengths if it has not received a valid ACK for the current packet. Failure to observe this restriction allows certain transmission errors to pass undetected.
If 1024 byte packets are being used, it is possible for a file to "grow" up to the next multiple of 1024 bytes. This does not waste disk space if the allocation granularity is 1k or greater. With YMODEM batch transmission, the optional file length transmitted in the file name packet allows the receiver to discard the padding, preserving the exact file length and contents.
1024 byte packets may be used with batch file transmission or with single file transmission. CRC-16 should be used with the k option to preserve data integrity over phone lines. If a program wishes to enforce this recommendation, it should cancel the transfer, then issue an informative diagnostic message if the receiver requests checksum instead of CRC-16. Under no circumstances may a sending program use CRC-16 unless the receiver commands CRC-16.

4. YMODEM Batch File Transmission
The YMODEM Batch protocol is an extension to the XMODEM/CRC protocol that allows 0 or more files to be transmitted with a single command. (Zero files may be sent if none of the requested files is accessible.) The design approach of the YMODEM Batch protocol is to use the normal routines for sending and receiving XMODEM packets in a layered fashion similar to Why was it necessary to design a new batch protocol when one already existed in MODEM7?[4] The batch file mode used by MODEM7 is unsuitable because it does not permit full pathnames, file length, file date, or other attribute information to be transmitted. Such a restrictive design, hastily implemented with only CP/M in mind, would not have permitted extensions to current areas of personal computing such as Unix, DOS, and object oriented systems. In addition, the MODEM7 batch file mode is somewhat susceptible to transmission impairments. As in the case of single a file transfer, the receiver initiates batch file transmission by sending a "C" character (for CRC-16).
The sender opens the first file and sends packet number 0 with the following information:[7]
Only the pathname (file name) part is required for batch transfers.
To maintain upwards compatibility, all unused bytes in packet 0 must be set to null.
Pathname The pathname (conventionally, the file name) is sent as a nullterminated ASCII string. This is the filename format used by the handle oriented MSDOS(TM) functions and C library fopen functions. An assembly language example follows:DB 'fname.bar',0 No spaces are included in the pathname. Normally only the file name stem (no directory prefix) is transmitted unless the sender has selected YAM's f option to send the full pathname. The source drive (A:, B:, etc.) is never sent.
Filename Considerations:
+ File names should be translated to lower case unless the sending system supports upper/lower case file names. This is a convenience for users of systems (such as Unix) which store filenames in upper and lower case.
+ The receiver should accomodate file names in lower and uppercase.
+ When transmitting files between different operating systems, file names must be acceptable to both the sender and receiving operating systems.
If directories are included, they are delimited by /; i.e., "subdir/foo" is acceptable, "subdir\foo" is not.
Length The file length and each of the succeeding fields are optional.[8] The length field is stored in the packet as a decimal string counting the number of data bytes in the file. The file length does not include any CPMEOF (^Z) or other garbage characters used to pad the last packet. If the file being transmitted is growing during transmission, the length field should be set to at least the final expected file length, or not sent.
The receiver stores the specified number of characters, discarding any padding added by the sender to fill up the last packet.
Modification Date The mod date is optional, and the filename and length may be sent without requiring the mod date to be sent.
If the modification date is sent, a single space separates the modification date from the file length.
The mod date is sent as an octal number giving the time the contents of the file were last changed, measured in seconds from Jan 1 1970 Universal Coordinated Time (GMT). A date of 0 implies the modification date is unknown and should be left as the date the file is received.
This standard format was chosen to eliminate ambiguities arising from transfers between different time zones.
Two Microsoft blunders complicate the use of modification dates in file transfers with MSDOS(TM) systems. The first is the lack of timezone standardization in MS-DOS. A file's creation time can not be known unless the timezone of the system that wrote the file[9] is known. Unix solved this problem (for planet Earth, anyway) by stamping files with Universal Time (GMT). Microsoft would have to include the timezone of origin in the directory entries, but does not. Professional-YAM gets around this problem by using the z parameter which is set to the number of minutes local time lags GMT. For files known to originate from a different timezone, the -zT option may be used to specify T as the timezone for an individual file transfer.
The second problem is the lack of a separate file creation date in DOS. Since most backup schemes used with DOS rely on the file creation date to select files to be copied to the archive, back-dating the file modification date could interfere with the safety of the transferred files. For this reason, Pro-YAM does not modify the date of received files with the header information unless the mod numeric parameter is non zero.
Mode If the file mode is sent, a single space separates the file mode from the modification date. The file mode is stored as an octal string. Unless the file originated from a Unix system, the file mode is set to 0. rb(1) checks the file mode for the 0x8000 bit which indicates a Unix type regular file. Files with the 0x8000 bit set are assumed to have been sent from another Unix (or similar) system which uses the same file conventions. Such files are not translated in any way.
Serial Number If the serial number is sent, a single space separates the serial number from the file mode. The serial number of the transmitting program is stored as an octal string.

Programs which do not have a serial number should omit this field, or set it to 0. The receiver's use of this field is optional.
Other Fields YMODEM was designed to allow additional header fields to beadded as above without creating compatibility problems with older YMODEM programs. Please contact Omen Technology if other fields are needed for special application requirements.
The rest of the packet is set to nulls. This is essential to preserve upward compatibility.[10]
If the filename packet is received with a CRC or other error, a retransmission is requested. After the filename packet has been received, it is ACK'ed if the write open is successful. If the file cannot be opened for writing, the receiver cancels the transfer with CAN characters as described above.

The receiver then initiates transfer of the file contents according to the standard XMODEM/CRC protocol. After the file contents have been transmitted, the receiver again asks for the next pathname. Transmission of a null pathname terminates batch file transmission. Note that transmission of no files is not necessarily an error. This is possible if none of the files requested by the sender could be opened for reading.
In batch transmission, the receiver automatically requests CRC-16.
The Unix programs sz(1) and rz(1) included in the source code file RZSZ[123.SHQ (rzsz1.sh, rzsz2.sh) should answer other questions about YMODEM batch protocol.

Figure 3. YMODEM Batch Transmission Session

```
SENDERRECEIVER"sb foo.s<CR>""sending in batch mode etc."C (command:rb) SOH
00 FF foo.c NUL[123] CRC CRCACKCSOH 01 FE Data[128] CRC CRCACKSTX 02 FD
Data[1024] CRC CRCACKSOH 03 FC Data[128] CRC CRCACKSOH 04 FB Data[100]
CPMEOF[28] CRC CRCACKEOTNAKEOTACKSOH 00 FF NUL[128] CRC CRCACK
```

Figure 4. YMODEM Filename packet transmitted by sz

```
-rw-rw-rw-  1 6347 Jun 17 1984 20:34 bbcsched.txt
00 0100FF&2 62637363 6865642E 74787400 |...bbcsched.txt.|10 36333437
20333331 34373432 35313320 |6347 3314742513 |20 31303036 34340000 00000000
00000000 |100644.....|30 00000000 00000000 00000000 0000000080
000000CA 56
```

Figure 5. YMODEM Header Information used by various programs

Program	Batch	Length	Date	Mode	S/N	Ik-Blk	g-Option
Unix rz/sz	ye	yes	yes	yes	no	yes	sb only
VMS rb/sb	yes	yes	no	no	no	yes	no
Pro-YAM	yes	yes	yes	no	yes	yes	yes
CP/M YAM	yes	no	no	no	no	yes	no
KMD/IMP	yes	?	no	no	no	yes	no

4.1 KMD/IMP Exceptions to YMODEM
KMD and IMP character sequence emitted by the receiver (CK) to automatically trigger the use of 1024 byte packets as an alternative to specifying this option on this command line. Although this two character sequence works well on single process micros in direct communication, timesharing systems and packet switched networks can separate the successive characters by several seconds, rendering this method unreliable.
Sending programs may detect the CK sequence if the operating environment does not preclude reliable implementation.
Receiving programs should retain the option of sending the standard YMODEM C (not CK) trigger with the standard 10 second timeout to insure compatibility with newer forms of telecommunications technology.

5. YMODEM-g File Transmission
Developing technology is providing phone line data transmission at ever higher speeds using very specialized techniques. These high speed modems, as well as session protocols such as X.PC, provide high speed, error free communications at the expense of considerably increased delay time.
This delay time is moderate compared to human interactions, but it cripples the throughput of most error correcting protocols.
The g option to YMODEM has proven effective under these circumstances. The g option is driven by the receiver, which initiates the batch transfer by transmitting a G instead of C. When the sender recognizes the G, it bypasses the usual wait for an ACK to each transmitted packet, sending succeeding packets at full speed, subject to XOFF/XON or other flow control exerted by the medium.
The sender expects an inital G to initiate the transmission of a particular file, and also expects an ACK on the EOT sent at the end of each file. This synchronization allows the receiver time to open and close files as necessary.
If an error is detected in a YMODEM-g transfer, the receiver aborts the transfer with the multiple CAN abort sequence. The YMODEM protocol should be used in applications that require both streaming throughput and error recovery.

Figure 6. YMODEM-g Transmission Session

```
SENDERRECEIVER"sb foo.s<CR>""sending in batch mode etc..."G (command:rb
-g) SOH 00 FF foo.c NUL[123] CRC
CRCSOH 01 FE Data[128] CRC CRCSTX 02
FD Data[1024] CRC CRCSOH 03 FC
Data[128] CRC CRCSOH 04 FB Data[100]
CPMEOF[28] CRC CRCEOTACKSOH 00 FF
NUL[128] CRC CRC
```

6. YMODEM PROTOCOL OVERVIEW
8/9/82 by Ward Christensen.
I will maintain a master copy of this. Please pass on changes or suggestions via CBBS/Chicago at (312) 545-8086, CBBS/CPMUG (312) 849-1132 or by voice at (312) 849-6279.
6.1 Definitions
<soh> 01H<ack> 06H<nak> 15H<can> 18H<C> 43H
6.2 Transmission Medium Level Protocol
Asynchronous, 8 data bits, no parity, one stop bit.
The protocol imposes no restrictions on the contents of the data beingtransmitted. No control characters are looked for in the 128-byte datamessages. Absolutely any kind of data may be sent - binary, ASCII, etc.The protocol has not formally been adapted to a 7-bit environment for thetransmission of ASCII-only (or unpacked-hex) data, although it could beeasily by having both ends agree to AND the protocol-dependent data with 7F hex before validating it. I specifically am referring to the checksums, and the block numbers and their ones-complement.
Those wishing to maintain compatibility of the CP/M file structure, i.e. to allow sodeming ASCII files to or from CP/M systems should follow this data format:
+ ASCII tabs used (09H), tabs set every 8.
+ Lines terminated by CR/LF (0DH 0AH)
+ End-of-file indicated by ^Z, 1AH. (one or more)
+ Data is variable length, i.e. should be considered a continuous stream of data bytes, broken into 128-byte chunks purely for the purpose of transmission.
+ A CP/M "peculiarity": If the data ends exactly on a 128-byte boundary,

i.e. CR in 127, and LF in 128, a subsequent sector containing the ^Z EOF character(s) is optional, but is preferred. Some utilities or user programs still do not handle EOF without ^Zs.

+ The last block sent is no different from others, i.e. there is no "short block".

Figure 7. XMODEM Message Block Level Protocol

Each block of the transfer looks like:<SOH><blk #><255-blk #><--128 data bytes--><cksum> in which:<SOH>= 01 hex<blk #>= binary number, starts at 01 increments by 1, and wraps OFFH to 00H (not to 01)<255-blk #>= blk # after going thru 8080 "CMA" instr, i.e. each bit complemented in the 8-bit block number. Formally, this is the "ones complement".<cksum>= the sum of the data bytes only. Toss any carry.

6.3 File Level Protocol

6.3.1
Common_to_Both_Sender_and_Receiver All errors are retried 10 times. For versions running with an operator (i.e. NOT with XMODEM), a message is typed after 10 errors asking the operator whether to "retry or quit".
Some versions of the protocol use <can>, ASCII ^X, to cancel transmission. This was never adopted as a standard, as having a single "abort" character makes the transmission susceptible to false termination due to an <ack><nak> or <soh> being corrupted into a <can> and aborting transmission.
The protocol may be considered "receiver driven", that is, the sender need not automatically re-transmit, although it does in the current implementations.

6.3.2
Receive_Program_Considerations The receiver has a 10-second timeout. It sends a <nak> every time it times out. The receiver's first timeout, which sends a <nak>, signals the transmitter to start. Optionally, the receiver could send a <nak> immediately, in case the sender was ready. This would save the initial 10 second timeout. However, the receiver MUST continue to timeout every 10 seconds in case the sender wasn't ready.
Once into a receiving a block, the receiver goes into a one-second timeout for each character and the checksum. If the receiver wishes to <nak> a block for any reason (invalid header, timeout receiving data), it must wait for the line to clear. See "programming tips" for ideas.
Synchronizing: If a valid block number is received, it will be: 1) the expected one, in which case everything is fine; or 2) a repeat of the previously received block. This should be considered OK, and only indicates that the receivers <ack> got glitched, and the sender re-transmitted; 3) any other block number indicates a fatal loss of synchronization, such as the rare case of the sender getting a line-glitch that looked like an <ack>. Abort the transmission, sending a <can>

6.3.3
Sending_program_considerations
While waiting for transmission to begin, the sender has only a single very long timeout, say one minute. In the current protocol the sender has a 10 second timeout before retrying. I suggest NOT doing this, and letting the protocol be completely receiver-driven. This will be compatible with existing programs.
When the sender has no more data, it sends an <eot>, and awaits an <ack>, resending the <eot> if it doesn't get one. Again, the protocol could be receiver-driven, with the sender only having the high-level 1-minute timeout to abort.
Here is a sample of the data flow, sending a 3-block message. It includes the two most common line hits - a garbaged block, and an <ack> reply getting garbaged. <xx> represents the checksum byte.

Figure 8. Data flow including Error Recovery

SENDER RECEIVER times out after 10 seconds,<--- <nak><soh> 01 FE -data- <xx>---><--- <ack><soh> 02 FD -data- xx---> (data gets line hit)<--- <nak><soh> 02 FD -data- xx---><--- <ack><soh> 03 FC -data- xx--->(ack gets garbaged)<--- <ack><soh> 03 FC -data- xx---> <ack><eot> --->(<--- <anything except ack><eot> --->(<--- <ack>(finished)

6.4 Programming Tips
+ The character-receive subroutine should be called with a parameter specifying the number of seconds to wait. The receiver should first call it with a time of 10, then <nak> and try again, 10 times.
After receiving the <soh>, the receiver should call the character receive subroutine with a 1-second timeout, for the remainder of the message and the <cksum>. Since they are sent as a continuous stream, timing out of this implies a serious like glitch that caused, say, 127 characters to be seen instead of 128.
+ When the receiver wishes to <nak>, it should call a "PURGE" subroutine, to wait for the line to clear. Recall the sender tosses any characters in its UART buffer immediately upon completing sending a block, to ensure no glitches were mis- interpreted.
The most common technique is for "PURGE" to call the character receive subroutine specifying a 1-second timeout,[1] and looping back to PURGE until a timeout occurs. The <nak> is then sent, ensuring the other end will see it.
+ You may wish to add code recommended by John Mahr to your character receive routine - to set an error flag if the UART shows framing error, or overrun. This will help catch a few more glitches - the most common of which is a hit in the high bits of the byte in two consecutive bytes. The <cksum> comes out OK since counting in 1-byte produces the same result of adding 80H + 80H as with adding 00H +00H.

7. XMODEM/CRC Overview
1/13/85 by John Byrns -- CRC option.
Please pass on any reports of errors in this document or suggestions for improvement to me via Ward's/CBBS at (312) 849-1132, or by voice at (312)885-1105.
The CRC used in the Modem Protocol is an alternate form of block check which provides more robust error detection than the original checksum. Andrew S. Tanenbaum says in his book, Computer Networks, that the CRC-CCITT used by the Modem Protocol will detect all single and double bit errors, all errors with an odd number of bits, all burst errors of length 16 or less, 99.997% of 17-bit error bursts, and 99.998% of 18-bit and longer bursts.
The changes to the Modem Protocol to replace the checksum with the CRC are straight forward. If that were all that we did we would not be able to communicate between a program using the old checksum protocol and one using the new CRC protocol. An initial handshake was added to solve this problem. The handshake allows a receiving program with CRC capability to determine whether the sending program supports the CRC option, and to switch it to CRC mode if it does. This handshake is designed so that it will work properly with programs which implement only the original protocol. A description of this handshake is presented in section 10.

Figure 9. Message Block Level Protocol, CRC mode

Each block of the transfer in CRC

mode looks like:<SOH><blk #><255-blk #><--128 data bytes--><CRC hi><CRC lo>in which:<SOH> = 01 hex<blk #> = binary number, starts at 01 increments by 1, andwraps OFFH to 00H (not to 01)<255-blk #> = ones complement of blk #.<CRC hi> = byte containing the 8 hi order coeffients of the CRC.<CRC lo> = byte containing the 8 lo order coefficients of the CRC.

7.1 CRC Calculation

7.1.1 Formal_Definition
To calculate the 16 bit CRC the message bits are considered to be the coefficients of a polynomial. This message polynomial is first multiplied by X^16 and then divided by the generator polynomial (X^16 + X^12 + X^5 +1) using modulo two arithmetic. The remainder left after the division is the desired CRC. Since a message block in the Modem Protocol is 128 bytes or 1024 bits, the message polynomial will be of order X^1023. The hi order bit of the first byte of the message block is the coefficient of X^1023 in the message polynomial. The lo order bit of the last byte of the message block is the coefficient of X^0 in the message polynomial.

Figure 10. Example of CRC Calculation written in C

```
UPDCRC update routine from "rbab.c". Refer to the source code for these programs (contained in RZ8Z1.SHQ and RZ8Z2.SHQ) for usage. A fast table driven macro is also included in this file./* update CRC */unsigned short updcrc(c, crc)register c;register unsigned crc;{register count;

for (count=8; --count>=0;) {if (crc & 0x8000) {crc <<= 1;crc += (((c<<=1) & 0400) != 0);crc ^= 0x1021;}else {crc <<= 1;crc += (((c<<=1) & 0400) != 0);}}return crc;}
```

7.2 CRC File Level Protocol Changes

7.2.1
Common_to_Both_Sender_and_Receiver
The only change to the File Level Protocol for the CRC option is the initial handshake which is used to determine if both the sending and the receiving programs support the CRC mode. All Modem Programs should support the checksum mode for compatibility with older versions. A receiving progras that wishes to receive in CRC mode implements the mode setting handshake by sending a <C> in place of the initial <nak>. If the sending program supports CRC mode it will recognize the <C> and will set itself into CRC mode, and respond by sending the first block as if a <nak> had been received. If the sending program does not support CRC mode it will not respond to the <C> at all. After the receiver has sent the <C> it will wait up to 3 seconds for the <soh> that starts the first block. If it receives a <soh> within 3 seconds it will assume the sender supports CRC mode and will proceed with the file exchange in CRC mode. If no <soh> is received within 3 seconds the receiver will switch to checksum mode, send a <nak>, and proceed in checksum mode. If the receiver wishes to use checksum mode it should send an initial <nak> and the sending progras should respond to the <nak> as defined in the original Modem Protocol. After the mode has been set by the initial <C> or <nak> the protocol follows the original Modem Protocol and is identical whether the checksum or CRC is being used.

7.2.2
Receive_Program_ConsiderationsThere are at least 4 things that can go wrong with the mode setting handshake.
1. the initial <C> can be garbled or lost.
2. the initial <soh> can be garbled.
3. the initial <C> can be changed to a <nak>.
4. the initial <nak> from a receiver which wants to receive in checksum can be changed to a <C>.
The first problem can be solved if the receiver sends a second <C> after it times out the first time. This process can be repeated several times. It must not be repeated too many times before sending a <nak> and switching to checksum mode or a sending program without CRC support may time out and abort. Repeating the <C> will also fix the second problem if the sending program cooperates by responding as if a <nak> were received instead of ignoring the extra <C>.
It is possible to fix problems 3 and 4 but probably not worth the trouble since they will occur very infrequently. They could be fixed by switching modes in either the sending or the receiving program after a large number of successive <nak>s. This solution would risk other problems however.

7.2.3
Sending_Program_Considerations
The sending program should start in the checksum mode. This will insure compatibility with checksum only receiving programs. Anytime a <C> is received before the first <nak> or <ack> the sending program should set itself into CRC mode and respond as if a <nak> were received. The sender should respond to additional <C>s as if they were <nak>s until the first <ack> is received. This will assist the receiving program in determiningthe correct mode when the <soh> is lost or garbled. After the first <ack> is received the sending program should ignore <C>s.

7.3 Data Flow Examples with CRC Option
Here is a data flow example for the case where the receiver requests transmission in the CRC mode but the sender does not support the CRC option. This example also includes various transmission errors. <xx> represents the checksum byte.

Figure 11. Data Flow: Receiver has CRC Option, Sender Doesn't

```
SENDERRECEIVER<---<C>times out after 3 seconds,<---<C>times out after 3 seconds,<---<C>times out after 3 seconds,<---<C>times out after 3 seconds,<---<nak><soh> 01 FE -data-<xx> --->x<---<ack><soh> 02 FD -data-<xx> --->(data gets line hit)<---<nak><soh> 02 FD -data- <xx> --->x<---<ack><soh> 03 FC -data- <xx> --->(ack gets garbaged)<---<ack>times out after 10 seconds,<---<nak><soh> 03 FC -data-<xx> --->x<---<ack><eot>--->x<---<ack>
```

Here is a data flow example for the case where the receiver requests transmission in the CRC mode and the sender supports the CRC option. This example also includes various transmission errors. <xxxx> represents the2 CRC bytes.

Figure 12. Receiver and Sender Both have CRC Option

```
SENDERRECEIVER<--- <C><soh> 01 FE -data- <xxxx> --->x<--- <ack><soh> 02 FD -data- <xxxx> --->(data gets line hit)<--- <nak><soh> 02 FD -data- <xxxx> --->x<--- <ack><soh> 03 FC -data- <xxxx> --->(ack gets garbaged)<--- <ack>times out after 10 seconds,<--- <nak><soh> 03 FC -data- <xxxx> --->x<--- <ack><eot> --->x<--- <ack>
```

8. MORE INFORMATION
More information may be obtained by calling Telegodzilla at 303-621-3746. Hit RETURNs for baud rate detection. Speed detection is automatic for 300,1200, and 2400 bps.
A version this file with boldface, underlining, and superscripts for printing on Epson or Gemini printers is available on Telegodzilla as "YMODEM8.DOC" or "YMODEM8.DOC".
UUCP sites can obtain this file withuucp

omen!/usr/spool/uucppublic/ymodem.doc /tmpA continually updated list of available files is stored in/usr/spool/uucppublic/FILES.
The following L.sys line calls Telegodzilla (Pro-YAM in host operation). Telegodzilla waits for carriage returns to determine the incoming speed. If none is detected, 1200 bps is assumed and a greeting is displayed.
In response to "Name Please:" uucico gives the Pro-YAM "link" command as a user name. The password (Gisnoid) controls access to the Xenix system connected to the IBM PC's other serial port. Communications between Pro-YAM and Xenix use 9600 bps; YAM converts this to the caller's speed.
Finally, the calling uucico logs in as uucp.
omen Any ACU 1200 1-503-621-3746 sai--sai: link ord: Gisnoid in:--in: uucp
Contact omen!caf if you wish the troff source files.

9. Document Revisions
The September 11 1986 edition clarifies nomenclature and some minor points. The April 15 1986 edition clarifies some points concerning CRC calculations and spaces in the header.

10. YMODEM Programs
A demonstration version of Professional-YAM is available as YMODEM.ARC. This may be used to test YMODEM and ZMODEM implementations.
Unix programs supporting the YMODEM protocol are available on Telegodzilla as RZSZ1.SHQ and RZSZ2.SHQ (SQueezed shell archives). Most Unix-like systems are supported, including V7, Xenix, Sys III, 4.2 BSD, SYS V, Idris, Coherent, and Regulus.

I. Available for IBM PC,XT,AT, Unix and Xenix
2. Infoworld April 29 p. 16
3. VAX/VMS versions of these programs are also available.
4. The file length, time, and file mode are optional. The pathname and file length may be sent alone if desired.
5. See "KMD/IMP Exceptions to YMODEM" below.
6. The MODEM7 batch protocol transmitted CP/M FCB bytes f1...f8 and t1...t3 one character at a time. The receiver echoed these bytes as received, one at a time.
7. Only the data part of the packet is described here.
8. Fields may not be skipped.
9. Not necessarily that of the transmitting system!
10. If, perchance, this information extends beyond 128 bytes (possible with Unix 4.2 BSD extended file names), the packet should be sent as a 1k packet as described above.
11. These times should be adjusted for use with timesharing systems.

A version for VAX-VMS is available in VRBSB.SHQ.
Irv Hoff has added YMODEM 1k packets and basic YMODEM batch transfers to the KMD and IMP series programs, which replace the XMODEM and MODEM7/MDM7xx series respectively. Overlays are available for a wide variety of CP/M systems.
Questions about YMODEM, the Professional-YAM communications program, and requests for evaluation copies may be directed to:
Chuck Forsberg
Omen Technology Inc
17505-V Sauvie Island Road
Portland Oregon 97231
Voice: 503-621-3406
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